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THE VEGETATION OF CONNECTICUT

II. VIRGIN FORESTS

BY GEORGE E. NICHOLS

In many respects the attitude of the forester toward a forest is radically opposed to that of the ecologist. To the former it represents merely the means to an end, to the latter it is the end in itself. The fundamental idea—the keynote, as it were—in the forester's treatment of the forest is utility. He estimates the value of a tract of woodland in board feet. His chief ambition is to secure a maximum yield per acre of the most desirable lumber. He regards the sawmill as the logical destination of every healthy tree. To him an over mature stand of heart-rotted veterans is an eyesore—they should be felled without delay in order to provide more space for younger generations. The ecologist, on the other hand, sees in such a group of trees the glorious consummation of long centuries of slow upbuilding on the part of Mother Nature. They represent the survivors of that keen competition and relentless struggle for existence to which their less fit comrades of earlier years have long since succumbed. To precipitate their downfall with the axe seems little short of desecration. Although forced to admit the economic necessity for the objective point of view of the forester, the viewpoint of the ecologist is mainly subjective. His interest in the forest is purely scientific, and anything which interferes with the normal consummation of natural laws is deprecated. Thus it is that the writer regards as a calamity the destruction during the past year of virtually the last remnant of the once vast primeval forests of this state.

At the time of its settlement, early in the seventeenth century,
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practically the entire state of Connecticut was densely wooded. Certain areas, of course, such as salt marshes and lakes, together with many swamps, rocky ridges, and sand plains, have never been covered by forests, and even before the advent of civilization there were doubtless considerable tracts, at least in the lowland, which in a more or less primitive way had been brought under cultivation. Almost the first task that confronted the settler was to dispose of the forest, and the work of destruction then inaugurated has continued almost incessantly for nearly three centuries. To be sure, the indiscriminate devastation which characterized the pioneer days was gradually discontinued when timber began to acquire a merchantable value, and in the Colonial period the forest resources of the state were a potent factor in the success of shipbuilding and other local industries. Even today there are numerous important lines of manufacture, notably that of brass, which owe their supremacy largely to the ready availability of a cheap, abundant, and constant supply of fuel wood. In the days of the stationary sawmill many tracts of virgin timber in the more inaccessible localities were left unscathed, and as late as the middle of the last century there was doubtless a considerable portion of the native forest that never had been encroached upon. But with the introduction of the portable sawmill and the improvement of transportation facilities, together with the increasing demand for timber, these remnants have rapidly disappeared, until at the present time there remain scarcely half a dozen patches of reputedly virgin forest, hardly one of which covers an area of more than a dozen acres. It must not be concluded, *a priori*, that the forests as such have actually been demolished, for it is estimated* that nearly half the total area of the state is still wooded. As a matter of fact, owing to the abandonment of unprofitable farmlands, the percentage of woodland has actually increased during the past few decades. But the woodlands of today are "second-growth" and may represent crops first, second, third, or even farther removed from the original stands. The probable relationship

* Frothingham, E. H. Second-growth hardwoods in Connecticut. U. S. Dept. Agr. Forest Service Bull. 96: 12. 1912.

between second growth forests and those from which they have been derived is discussed in a later paragraph.

The principal object of this paper is to place on record a series of observations made in the Carrington Phelps forest at Colebrook, a magnificent stand of virgin timber fully 300 acres in extent which has been referred to by Hawes* as the most perfect admixture of the northern and southern New England forest types he had ever seen. Unlike most Connecticut forests it, until recently, not only had remained practically unmolested by the lumberman, but it also seems to have been singularly immune from devastation by fire, the greater part of the area apparently not having been burned over for nearly three centuries. Without doubt this tract represented the type of climax forest which formerly prevailed over at least the greater part of northwestern Connecticut and on this account it is of peculiar interest. It was first brought to the writer's attention during the summer of 1911 and at that time a cursory survey was made. Since then several visits have been paid to the vicinity, the latest one shortly before the completion of the present paper, and the area has been carefully studied. Unfortunately extensive lumbering operations commenced early in 1912, so that at the present writing the greater portion of the forest has been reduced to treeless stumps, heaps of brush, and piles of sawdust.

As throughout most of Litchfield County the topography of the region concerned is very uneven and the elevations high. The forest was located partly in a rather broad valley, partly on the slopes of adjoining hills. The surface soil is of glacial origin, a sandy loam, often rocky, beneath which at varying depths is a substructure of precambrian gneiss which frequently outcrops at higher levels. A sizeable stream traverses the valley and in certain sections the ground is swampy. These swampy areas will not be considered here. On the whole the soil is well drained, although there is naturally more or less contrast in this respect between the slopes and the leveler valley floor. The surface of the ground is covered with a layer of humus which varies in thickness from 5 to nearly 30 centimeters.

* Hawes, A. F., and Hawley, R. C. Forest survey of Litchfield and New Haven Counties, Connecticut. Conn. Agr. Exp. Sta. Bull. 162: 16. 1909.

Of the more than a dozen trees which enter into the composition of the Colebrook forest two species, *Tsuga canadensis* and *Fagus grandifolia*, stand preëminent.* On the whole these are



FIG. 1. Interior view of Colebrook forest. To right of center is a typical example of a "stag-headed" hemlock.

about equally abundant and, taken together, comprise at least 55 per cent. of the entire stand. Of course the relative proportions of the two vary locally, but almost without exception one or the

* For the sake of convenience the present tense is used largely throughout the following description.

other is dominant. In some low sites hemlock includes more than 75 per cent. of the stand. The remainder of the forest is made up approximately as follows: *Acer Saccharum*—12 per cent. of the total number of trees; *Betula lutea*—10 per cent.; *Quercus rubrum*—6 per cent.; *Castanea dentata*—6 per cent.; *Fraxinus americana* and *Tilia americana*—7 per cent.; *Prunus serotina*, *Betula lenta*, *Acer rubrum*, and *Pinus Strobus*—4 per cent. For the most part the foregoing species occur scattered more or less indiscriminately through the forest, interspersed amid hemlock and beech. Chestnut, however, is somewhat localized, being more abundant on certain upland slopes than elsewhere.

Perhaps the most impressive feature of a virgin forest such as this is the great size attained by the mature trees. Their massive boles, from 60 cm. to more than a meter in diameter at breast height, and towering upward to a height of from 27 to more than 33 m., are usually clear of branches for a distance of from 12 to 18 m. from the ground, a fact which serves to accentuate their immensity. At 33 m. or less, height growth usually, though not invariably, ceases and commonly the trees become "stag-headed" (fig. 1). But growth in thickness continued so that the trunks wax more and more bulky with age. Thus, in a typical instance, it was found that the trunk of a hemlock 32 m. in height exhibited the following diameter measurements at the indicated distances above the ground: height 75 cm.—diameter 80 x 90 cm.; 8 m.—65 cm.; 16 m.—60 cm.; 24 m.—40 cm.; 27 m.—20 cm. A series of measurements and annual ring counts were taken with a view of ascertaining as nearly as possible the size and age attained by various trees in the original forests, and on a basis of these hemlock would seem to have included the oldest and most of the largest trees in the present stand. For this species the average diameter of mature specimens is nearly 90 cm., while three stumps (height about 60 cm.) having diameters of 150, 127 (fig. 2), and 115 cm., respectively, were noted. The majority of trees with a diameter of more than 90 cm. are rotten at the heart. The average age of mature trees is about 275 years, but a maximum was observed of about 350 years. As might be anticipated, there is no exact correspondence between age and trunk diameter.

Thus two trees having diameters of 1.25 and 15 cm. and heights of 1 and 7 m. respectively were each found to be 25 years old. Similarly in the case of two specimens each of which measured 77 cm. in diameter at the age of 250 years, the diameters at 50

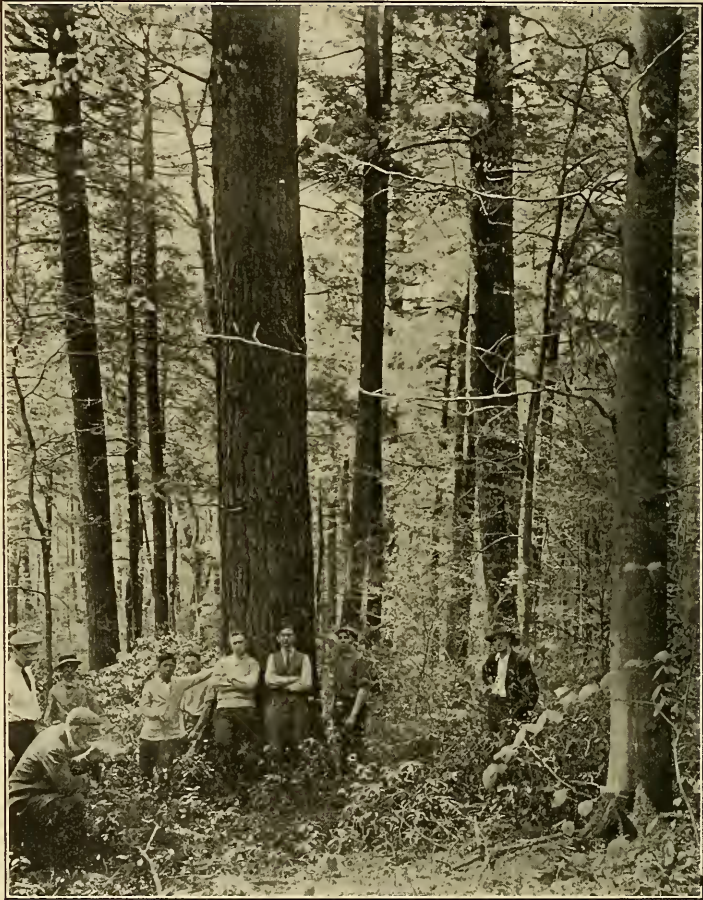


FIG. 2. Interior view of Colebrook forest. Hemlock and beech. Underbrush composed of laurel and hobble bush.

years were 3.1 and 22.5 cm. respectively. This disparity is of course to be correlated with environmental conditions, especially with the degree of shade or exposure to which the young trees

have been subjected. A striking illustration of the effect of early shading and subsequent cover removal is afforded by one tree which at the age of 125 years had acquired a diameter of scarcely 14 cm. At this time (1781) a fire resulted in the removal of many of its neighbors and growth became so accelerated that during the succeeding 17 years its trunk more than doubled in thickness. In general, shade-grown trees appear to have been suppressed for a period of from 100 to 150 years and at that age possess scarcely one third the diameter of trees grown under more favorable conditions. Accelerated diameter growth is the natural result of increased exposure to light, which may be brought about either by the continued upward growth of the individual concerned or through the death of surrounding trees. The largest beech observed measured about 85 cm. in diameter. Several 60 cm. specimens were found to be from 200 to 225 years in age. Sugar maples with a diameter of more than 75 cm. are frequent, the largest individual measured being about 105 cm. thick. Such trees are from 250 to 300 years old. Red oak also attains great size and antiquity, a few specimens fully a meter in diameter and 300 years old being noted. Yellow birch commonly acquires a diameter of 75 cm., and one large individual measured more than 3 m. in circumference. Nowhere in the state has the writer observed such magnificent chestnuts as here. The largest trunk seen had a diameter of 132 cm., while trees 75-100 cm. in diameter, 30 m. high, and branchless to a distance of 15 m. from the ground are quite frequent in certain localities. Chestnut usually grows rapidly, and the largest individuals observed had not yet reached the age of 150 years. Ash, basswood, and cherry likewise grow to large size, while among the most imposing trees of the entire forest are a few tall pines which rise to a height of more than 35 m.

But while these aged veterans form the conspicuous part of the forest they by no means constitute a plurality. For as in most virgin woodlands the stand here is of uneven age so that every stage in development and deterioration is present—from the slender saplings to the rotting logs with which the ground is strewn on all sides. It is of import to note that the character of

the seedlings is essentially the same as that of the adult trees, a fact which would indicate that the present type of forest is naturally self-perpetuating and therefore permanent.

Though not, perhaps, quite so spectacular as the arborescent portion of the forest, yet to one accustomed to the omnipresent *Kalmia latifolia*-*Gaylussacia baccata*-*Rhododendron nudiflorum* thickets of the ordinary Connecticut woodlands the luxuriance of the underbrush here is a revelation. As elsewhere, to be sure, laurel is an important constituent, but along with this occur in profusion two other shrubs which even in northern Connecticut are seldom encountered in second-growth forests, viz., *Viburnum alnifolium* and *Taxus canadensis*. The usual failure of these plants to survive the effects of lumbering is doubtless due to their extreme mesophytism and shallow root systems. The yew is much commoner in the lower grounds than on the drier slopes and frequently preëmpts considerable patches to the exclusion of all other undergrowth. *Hamamelis virginiana*, *Viburnum acerifolium*, *Cornus alternifolia*, and *Lonicera canadensis* are not infrequent, while *Sambucus racemosa* occurs locally. Associated with these shrubs and occasionally forming a distinct stratum or story of vegetation are two small trees, *Acer pennsylvanicum* and *Acer spicatum*. These rarely attain a height of more than 6 m. with a diameter of 15 cm. and, like the hobble bush, are characterized by their broad, thin, mesophytic leaves. Seedlings of the various larger trees also constitute a significant part of the underbrush, and the high degree of mesophytism in such a forest is emphasized by the fact that these often germinate luxuriantly upon rotting logs and decaying stumps, a phenomenon seldom witnessed in the more xerophytic second-growth woodlands. In a forest similar to this one, at Sheffield, Massachusetts, the writer counted more than a hundred seedlings of hemlock and yellow birch flourishing on a 15 meter log.

In view of the richness of the substratum the number of species of herbaceous vascular plants native to the Colebrook forest at first thought seems surprisingly small. This paucity may doubtless be attributed to the lack of environmental diversity, coupled with the inability of any but tolerant species to endure the deep

shade of the forest floor. In many parts of the tract the moldy soil appears almost devoid of plant life over considerable areas, while in densely brushed places herbaceous vegetation is invariably sparse. The following list includes all the pteridophytes and herbaceous spermatophytes that have been observed by the writer during his several visits to the forest.

<i>Polypodium vulgare</i>	<i>Habenaria macrophylla</i>
<i>Phegopteris polypodioides</i>	<i>Epipactis pubescens</i>
<i>Asplenium acrostichoides</i>	<i>Coptis trifolia</i>
<i>Asplenium Filix-foemina</i>	<i>Actaea alba</i>
<i>Polystichum acrostichoides</i>	<i>Caulophyllum thalictroides</i>
<i>Aspidium noveboracense</i>	<i>Tiarella cordifolia</i>
<i>Aspidium spinulosum</i> inter- medium	<i>Mitella diphylla</i>
<i>Botrychium virginianum</i>	<i>Dalibarda repens</i>
<i>Lycopodium lucidulum</i>	<i>Oxalis Acetosella</i>
<i>Lycopodium obscurum</i>	<i>Viola rotundifolia</i>
<i>Brachyelytrum erectum</i>	<i>Circaea alpina</i>
<i>Festuca nutans</i>	<i>Aralia racemosa</i>
<i>Carex Deweyana</i>	<i>Aralia nudicaulis</i>
<i>Carex gracillima</i>	<i>Osmorhiza Claytoni</i>
<i>Carex communis</i>	<i>Chimaphila umbellata</i>
<i>Carex varia</i>	<i>Pyrola chlorantha</i>
<i>Carex pennsylvanica</i>	<i>Pyrola elliptica</i>
<i>Carex laxiflora patulifolia</i>	<i>Monotropa uniflora</i>
<i>Carex arctata</i>	<i>Gaultheria procumbens</i>
<i>Arisaema triphyllum</i>	<i>Trientalis americana</i>
<i>Clintonia borealis</i>	<i>Epifagus virginiana</i>
<i>Smilacina racemosa</i>	<i>Mitchella repens</i>
<i>Maianthemum canadense</i>	<i>Solidago caesia</i>
<i>Streptopus roseus</i>	<i>Aster divaricatus</i>
<i>Medeola virginiana</i>	<i>Aster lateriflorus</i>
<i>Trillium undulatum</i>	<i>Aster acuminatus</i>
<i>Cypripedium acaule</i>	<i>Prenanthes</i> sp.

Of the plants above listed the greater number are rather widely distributed throughout the tract. Two of the most representative forms are shown in fig. 3. Some species, as for example *Phegopteris polypodioides*, *Arisaema triphyllum*, *Clintonia borealis* and *Coptis trifolia*, are characteristic of low woods. *Lycopodium lucidulum* is particularly abundant in such sites, where with the

yew it often forms a dense carpet over the surface of the ground. Others are restricted to upland woods, *e. g.*, *Festuca nutans*, *Carex Deweyana*, *Carex arctata*, and *Pyrola chlorantha*. A few, such as *Cypripedium acaule*, *Caulophyllum thalictroides* and *Dalibarda repens*, are quite local in their occurrence. The scarcity of autumn flowering plants is remarkable. In late September almost the only conspicuous form in blossom is *Aster divaricatus*.

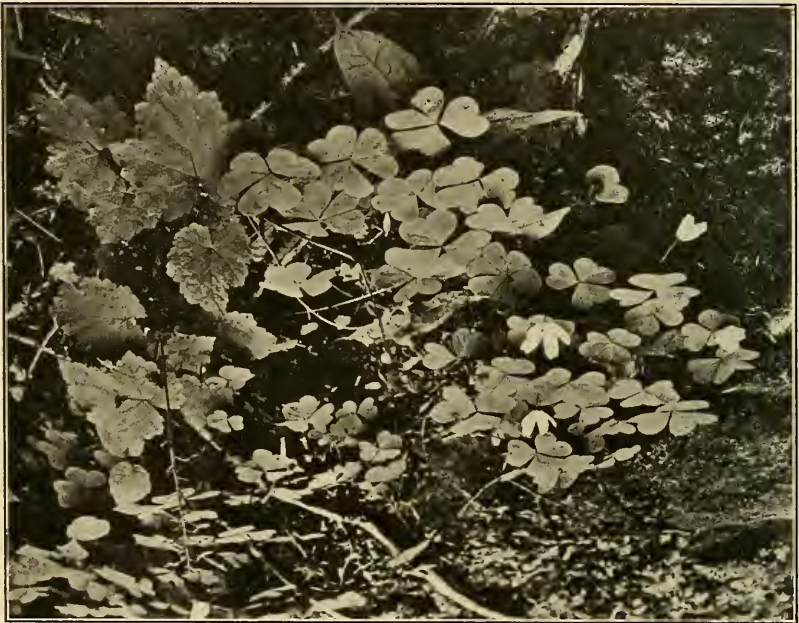


FIG. 3. *Oxalis Acetosella* (in flower) and *Tiarella cordifolia* (in fruit). Colebrook forest.

Hardly less striking is the relative abundance of northern species which elsewhere in the state are either absent or confined to cool ravines. *Habenaria macrophylla*, for example, has been definitely recorded from but one other Connecticut locality, yet here it is not infrequent, though rare in flower.

No one feature better suggests the intense mesophytism of this forest than the character and distribution of the bryophytes. Not only do these commonly form a rich covering over the

surface of the ground, on roots, logs, stumps, and boulders, but they also plaster the bases of trees, extending up their trunks to a height of 24 meters. Maple, birch, and beech particularly are thus covered while, as a rule, hemlock is singularly immune from epiphytes of any description. The more prevalent mosses and liverworts observed may be classified roughly according to habitat as follows.

Growing on the ground, roots, logs, or stumps:

<i>Cephalozia curvifolia</i>	<i>Anomodon attenuatus</i>
<i>Cephalozia media</i>	<i>Thuidium recognitum</i>
<i>Cephalozia serriflora</i>	<i>Thuidium delicatulum</i>
<i>Bazzania trilobata</i>	<i>Brachythecium</i> sp.
<i>Dicranum scoparium</i>	<i>Rhynchostegium serrulatum</i>
<i>Dicranum flagellare</i>	<i>Stereodon imponens</i>
<i>Dicranum montanum</i>	<i>Stereodon cupressiformis</i>
<i>Dicranum viride</i>	<i>Stereodon fertilis</i>
<i>Dicranella heteromalla</i>	<i>Heterophyllum Haldanianum</i>
<i>Leucobryum glaucum</i>	<i>Georgia pellucida</i>
<i>Mnium cuspidatum</i>	<i>Catharinaea undulata</i>
<i>Aulacomnium heterostichum</i>	<i>Polytrichum ohioense</i>

Growing on rocks and boulders:

<i>Metzgeria furcata</i>	<i>Anomodon attenuatus</i>
<i>Scapania nemorosa</i>	<i>Anomodon rostratus</i>
<i>Lejeunea cavifolia</i>	<i>Pterigynandrum filiforme</i>
<i>Dicranum fulvum</i>	<i>Thuidium recognitum</i>
<i>Fissidens adiantoides</i>	<i>Brachythecium oxycladon</i>
<i>Grimmia apocarpa</i>	<i>Brachythecium populeum</i>
<i>Ulota Hutchinsiae</i>	<i>Sematophyllum tenuirostre</i>
<i>Bryum capillare</i>	<i>Isopterygium elegans</i>
<i>Hedwigia albicans</i>	<i>Plagiothecium denticulatum</i>
<i>Entodon cladorrhizans</i>	<i>Amblystegiella adnata</i>

Growing on trunks of trees:

<i>Metzgeria furcata</i>	<i>Ulota ulophylla</i>
<i>Radula complanata</i>	<i>Leucodon brachypus</i>
<i>Porella platyphylla</i>	<i>Forsstroemia trichomitria</i>
<i>Cololejeunea Biddlecomiae</i>	<i>Neckera pennata</i>
<i>Frullania Asagrayana</i>	<i>Haplomyenium triste</i>
<i>Orthotrichum</i> sp.	<i>Platygyrium repens</i>
<i>Drummondia clavellata</i>	<i>Pylaisia Schimperii</i>

Growing on bases of trees:

Dicranum flagellare

Anomodon rostratus

Anomodon attenuatus

Raia scita

Also most of the species in the preceding list.

General problems relating to the phenomena of plant succession are to be discussed in later papers. Because, however, of their bearing on the broader question of the relationship between the forests of the present and those of the past it seems advisable in the present connection to call attention briefly to certain facts deduced from a study of second-growth woodlands at Colebrook, in localities which almost certainly were once occupied by forests similar to the one above depicted. In the majority of cases such tracts are less mesophytic than the original forest, as is evidenced by the usual presence of *Betula alba papyrifera* and *Pinus Strobus* as character trees, together often with *Carya ovata* and *Carya glabra*. The proportion of chestnut and red oak is greater here than in the virgin forest while hemlock is ordinarily much less abundant. The increased percentage of the two species first mentioned is doubtless, in large part, to be accounted for by their well known prolific sprouting capacity. One striking example of the propensity of chestnut to reproduce in this manner was noted by the writer where a single 75 centimeter stump had given rise to more than 375 coppice shoots. Apropos it may be remarked that, according to Frothingham,* much the greater part of the present Connecticut forests have originated in this way, while recent estimates† show that chestnut today comprises fully 50 per cent. of the standing timber in the state. Like most conifers, hemlock fails to develop adventitious buds, and is consequently dependent entirely upon seed reproduction, a comparatively slow and uncertain method of propagation. The xerophytic proclivity of second-growth tracts is further reflected by the character of the undergrowth. The yew, hobble bush, and moosewood are sparser and may have vanished completely, while *Prunus pennsylvanica*, *Gaylussacia baccata*, and species of *Vaccinium* have made their appearance. Many of the her-

* Op. cit., p. 13.

† Frothingham, l. c.

baceous mesophytes also, like the twisted stalk, painted trillium, and wood sorrel, have disappeared, being supplanted in a measure by such plants as *Lycopodium complanatum*, *Lycopodium clavatum*, *Dicksonia punctilobula*, and *Pteris aquilina*, forms rarely seen in the original forest. Even the bryophytic flora has become greatly modified, mesophytic shade species having given way to forms such as *Polytrichum commune* and *Hypnum Schreberi*.

In many instances fire has unquestionably played an important rôle in the changes which have been wrought, for the hemlock with its shallow root system, rarely penetrating more than 50 centimeters below the surface, is much more susceptible to such a calamity than are deeper rooted trees. One notable instance of the effect which fire may have on the composition of a forest is afforded by a portion of the virgin tract above described which, as attested by numerous fire scars, was severely burned over in or about the years 1781 and 1794. In this plot of about 20 acres hemlock is practically lacking and most of the larger trees are chestnut. Of special interest is the fact that of more than a dozen chestnuts and red oaks whose age was ascertained, every one sprang into existence within five years after the last fire, presumably originating as coppice shoots.

But while in the majority of cases retrogression has taken place several second-growth tracts have been observed which in composition seem essentially identical with the original forest. Indeed in a few cases the proportion of hemlock has apparently increased. Such woodlands appear to be restricted to localities in which edaphic conditions are exceptionally congenial, *e. g.*, sheltered valleys, and where they have been protected from the ravages of fire. The presence of such unmodified areas is of importance, for it justifies the conclusion that although ordinarily the contemporaneous woodlands of Connecticut may not resemble the original forests, nevertheless in suitable sites and under favorable conditions the physiognomy of the forest may have remained practically unaltered. Finally, it should be remarked that no matter how far retrogression may have proceeded there is usually ample evidence afforded by the character of the seedlings that if left undisturbed a forest in most cases would slowly but surely revert to approximately the climax type.

With the eradication of the Colebrook forest Connecticut's primeval woodlands have become practically a thing of history, for the few vestiges of virgin timber that are still preserved serve as little more than poor reminders of the grandeur which the forests of the past must have possessed. Of the areas of this sort which have come to the writer's attention three are situated in the northwestern part of the state. One of these (fig. 4), on the estate of Mr. Carl Stoeckel at Norfolk, so far as it



FIG. 4. Beech in Norfolk forest.

goes is an almost exact counterpart of the Colebrook forest. Another is in the upper part of Sage's Ravine, a wild, picturesque spot in the town of Salisbury. Here hemlock and yellow birch are the prevailing trees, while moosewood, striped maple, yew, hobble bush, and laurel are abundant. The resemblance to the Colebrook forest is again noticeable, but an even higher degree of

mesophytism is attained. The third remnant in this part of the state is at Cornwall, the property of Mr. John Calhoun (fig. 5). This plot differs from any of the preceding in that the dominant tree is *Pinus Strobus*. Hawes* describes the trees in this group



FIG. 5. Pine forest at Cornwall.

as "the most magnificent white pines that can be found in the East, fully equal to the best timber in the Lake States." Many of them tower up to a height of 45 meters and have diameters of nearly a meter. It is a significant fact, however, that although

* Op. cit., 16.

the pine includes most of the mature trees here, the rising generation is composed mainly of hemlock, with a sprinkling of sugar maple, yellow birch, beech, and other hardwoods. Obviously pine does not represent the ultimate type.

In northeastern Connecticut there are two forests which at least closely approximate the virgin state. The largest of these lies in the town of Woodstock, about three miles south of the Massachusetts state line, and is known locally as "Lawson's Pines." For the most part the area is covered with a mixed stand of large pine and hemlock, but in places the growth is almost pure pine. Chestnut, white oak (*Quercus alba*), and red oak are important secondary species, but beech is absent and yellow birch uncommon. A dense laurel tangle occupies most of the forest floor while tree seedlings are also present in greater or less abundance. White pine reproduction, however, is noticeably sparser than that of hemlock and hardwoods. The second tract is in the town of Pomfret, about half a mile from the station of Abington. The dominant trees here are chestnut, red oak, and white oak. Hemlock is not common and beech seems to be missing. Laurel, witch hazel, huckleberry, and pink azalea comprise much of the underbrush.

Southeastern Connecticut, so far as ascertained, possesses only one possible fragment of original forest and, notwithstanding the owner's assurance that the area has never been cut over, the writer must confess to some doubt as to the primeval nature of the tract. The area in question, some 40 acres in extent, occupies a low hill bordering the Sound at the mouth of the Pawcatuck River in the town of Stonington. In contrast to the forests heretofore described there is a complete absence of hemlock, beech, sugar maple, yellow birch, pine, and even chestnut. The character trees are white oak and black oak (*Quercus velutina*), especially the former, associated with which are shagbark hickory and red maple. The stand is of a more open character than in any of the areas previously mentioned and in general aspect the forest resembles the climax oak-hickory type of the Chicago region.* Trees with a diameter of from 45 to 60 centimeters

* See Cowles, H. C. The physiographic ecology of Chicago and vicinity. Bot. Gaz. 31: 78 ff. 1901.

are common. The ground is not deeply shaded and the low, dense underbrush is quite xerophytic, being composed largely of *Gaylussacia baccata*, *Vaccinium corymbosum*, *Vaccinium stamineum*, and *Corylus americana*. It is of course not impossible that the xero-mesophytic nature of the tract is due to its extremely exposed location and that it really represents a virgin forest. Moreover it must be borne in mind that in general the forests of eastern Connecticut are less mesophytic than are those in other parts of the state.

No primeval tracts of undoubted authenticity have yet been discovered either in the central lowland or in southwestern Connecticut. There is, however, a small grove at the head of Lake Saltonstall, in East Haven, which is certainly very close to the virgin condition and which probably represents the type of forest that formerly prevailed along the lower slopes and moister parts of the trap ranges. Hemlock is the character tree here and associated with it are beech, chestnut, sugar maple, red oak, and ash. Many of the trees are of large dimensions. It seems not unlikely, also, that some of the sand plain forests of *Pinus rigida*, such as are common in the region about Farmington, may be virgin or nearly so. These will be referred to again in a later paper.

YALE UNIVERSITY

FOUR UNDESCRIBED WEST INDIAN SEDGES

BY N. L. BRITTON

Stenophyllus Wilsoni sp. nov.

Perennial by short stout rootstocks; culms clustered, somewhat flattened, smooth, stiff but rather slender, erect, 2-3 dm. tall. Basal sheaths 3 or 4, bladeless, acute, many-nerved, floccose-pubescent, the upper with a scarious margin. Spikelets 2-5 together in a terminal capitate cluster subtended by a subulate bract 0.5-2 cm. long, or sometimes by 2 bracts; spikelets linear-oblong, much compressed, 1-2 cm. long, 4 mm. wide; scales narrowly oblong to oblong-lanceolate, loosely pubescent,